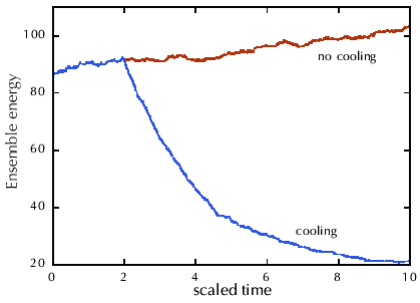
Background

Daniel A. Steck—Theoretical Division (T-8)

- Experimental atom optics (cold atoms in optical lattices)
- Quantum chaos, quantum dynamical systems
  - With Mark Raizen (UT—Austin)
- Major experimental results
  - Decoherence effects
    - Direct observation of delocalization in the kicked rotor
    - Quantitative study of quantum-classical transition
- Quantum transport
  - Study of quantum dynamics in mixed phase space
  - Observation of dynamical tunneling
  - Observation of chaos influence on tunneling (chaos-assisted tunneling)
  - Requires near-minimum uncertainty states

Current Interests

- Quantum dynamical systems
- Connection with experiments
- Current projects
  - Quantum feedback control—
    with Salman Habib, Kurt Jacobs, Tanmoy Bhattacharya, and Hideo Mabuchi
    - atom trapped in a cavity (strong coupling)
    - cavity output light provides position measurement
    - Design and test experimentally feasible feedback cooling algorithms



Current Interests (continued)

- Quantum-classical transition—with Salman Habib, Tanmoy Bhattacharya
  - Tests of quantum-classical correspondence, esp. in higher dimensions
- Nonlinear dynamics of BECs—with Salman Habib, Eddy Timmermans
  - Raizen group experiments: BECs in nonlinear potentials
  - Requires beyond -GPE modeling methods
  - Theory less clear